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I HEREBY CERTIFY that annexed hereto is a true copy of the documents filed in connection with the following patent application:

Application No. S2002/0289

Date of Filing 19/04/2002

Applicant Xsil Technology Limited, An Irish company of Unit 2, Trinity Enterprise Centre, Pearse Street, Dublin 2, Ireland

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Dated this 29th day of April 2003.

Brian Mc Kernan

An officer authorised by the
Controller of Patents, Designs and Trademarks.

FORM NO. 1

APPLICATION No. S020289

REQUEST FOR THE GRANT OF A PATENT

PATENTS ACT, 1992

The Applicant(s) named herein hereby request(s)

______ the grant of a patent under Part II of the Act

__X__ the grant of a short-term patent under Part III of the Act

on the basis of the information furnished hereunder.

1. Applicant(s)

Name Xsil Technology Limited

Address
Unit 2
Trinity Enterprise Centre
Pearse Street
Dublin 2
Ireland

Description/Nationality

An Irish company

2. Title of Invention

"Laser Machining"

3. Declaration of Priority on basis of previously filed application(s) for same invention (Sections 25 & 26)

Previous filing date	Country in or for which filed	Filing No.

4. Identification of Inventor(s)
Name(s) of person(s) believed
by Applicants(s) to be the inventor(s)

BOYLE, Adrian
an Irish citizen of
9 Togher Grove, Monasterevin, County Kildare, Ireland

MEIGHAN, Oonagh
an Irish citizen of
45, Grangemore Drive, Grangemore, Dublin 13, Ireland

5. Statement of right to be granted a patent (Section 17(2) (b)

The Applicant derives the rights to the Invention by virtue of a Deed of Assignment dated April 19, 2002

6. Items accompanying this Request – tick as appropriate

(i) X prescribed filing fee (EUR60.00)
(ii) ____ specification containing a description and claims
X specification containing a description only
X Drawings referred to in description or claims
(iii) ____ An abstract
(iv) ____ Copy of previous application (s) whose priority is claimed
(v) ____ Translation of previous application whose priority is claimed
(vi) X Authorisation of Agent (this may be given at 8 below if this Request is signed by the Applicant (s)

7. Divisional Application (s)

The following information is applicable to the present application which is made under Section 24 –

Earlier Application No: ....
Filing Date: ....

8. Agent

The following is authorised to act as agent in all proceedings connected with the obtaining of a patent to which this request relates and in relation to any patent granted -

Name	Address
John A. O'Brien & Associates	The address recorded for the time being in the Register of Patent Agents, and currently Third Floor, Duncairn House, 14 Carysfort Avenue, Blackrock, Co. Dublin, Ireland.

9. Address for Service (if different from that at 8)

As above

Signed ______________ JOHN A. O'BRIEN & ASSOCIATES

Date April 19, 2002

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LODGED

APPLICATION No. S 0 2 0 2 8 9

"Laser Machining"

Introduction

The invention relates to a method of using a laser to dice substrates, particularly semiconductor substrates.

Wafer dicing is a critical aspect of package assembly that facilitates all subsequent operations in the assembly process. This is conventionally achieved by dicing the wafer with a mechanical saw. This has disadvantages such as low yield, chipping and cracks. Thin wafers cannot be machined due to the stresses induced in the wafer by the saw resulting in low die strength. The strength of the dies produced when a semiconductor substrate is diced is an important factor as low die strengths reduce reliability. Improving die strength improves device reliability, and minimises breakages and the onset of microcracking.

Statements of Invention

According to the invention, there is provided a method of dicing a substrate comprising the steps of:-

> directing a laser beam at the substrate to dice the substrate such that the dies have rounded corners.

The resulting die shape gives improved die strength.

In one embodiment, the laser beam is generated by a Q-switched laser device.

In one embodiment, the beam is directed by rotating mirrors.

The invention also provides a laser machining system comprising means for machining in a method as defined above.

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a plan view of a diced silicon wafer;

Fig. 2 shows a group of conventionally diced dies; and

Fig. 3 shows a group of dies with rounded corners.

A laser beam is used to dice devices from a wafer by scanning a Q-switched laser beam over the wafer surface using rotating mirrors in a galvanometer type system in a pattern such as that shown in Fig 3. Machining of die with rounded corners is easier to achieve and is more accurate when using a galvanometer based laser machining system in comparison with a conventional mechanical saw based dicing system. Laser dicing also provides the advantage of narrower street widths between adjacent diced die and hence a greater number of die can be patterned on a given wafer.

Using a laser to produce dies with rounded corners improves die strength and enables dicing of thin wafers. The rounded corners eliminate the stresses that are induced due to the sharp corners of rectangular die.

The invention is not limited to the embodiments described but may be varied in construction and detail.

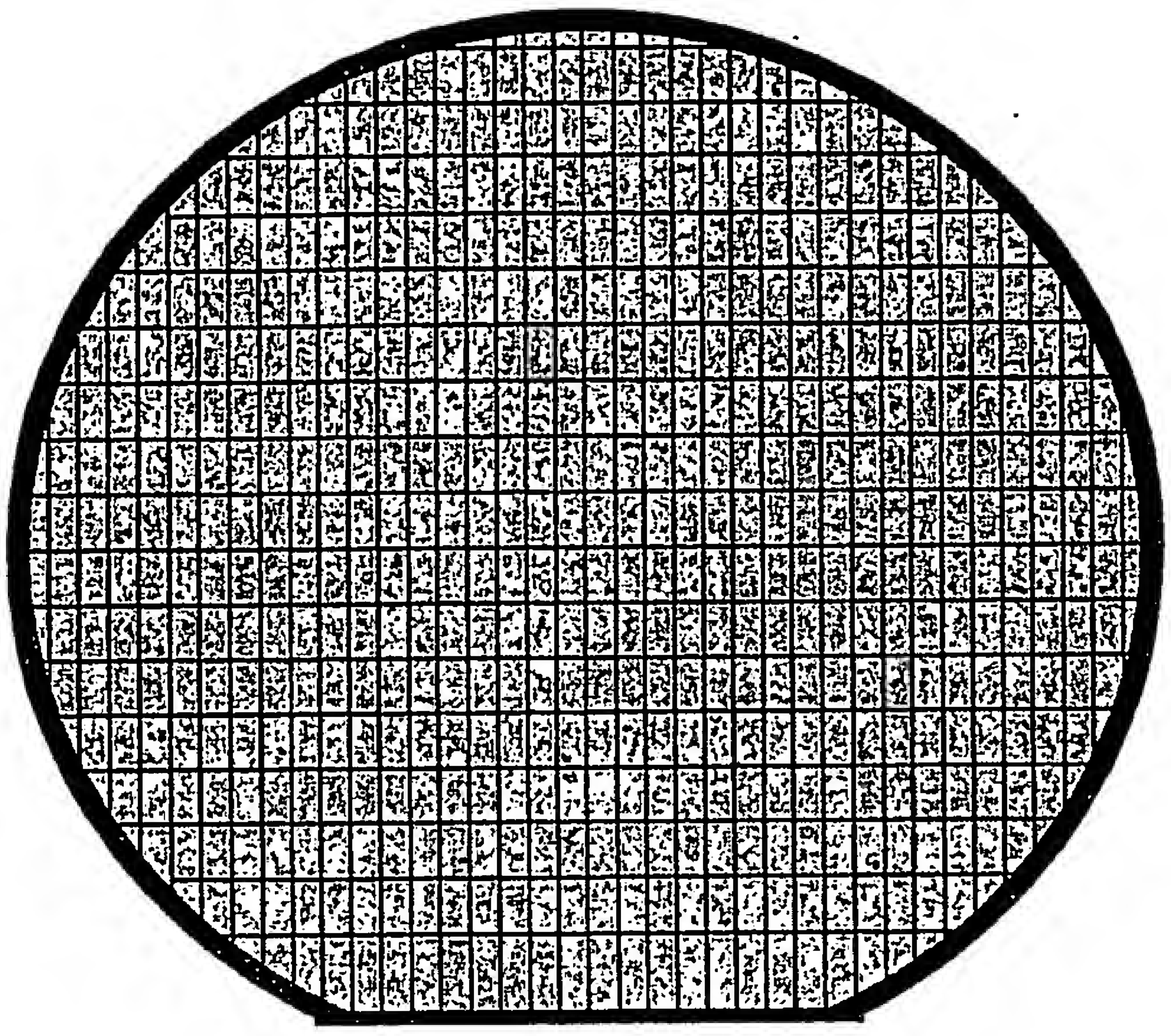

Fig. 1

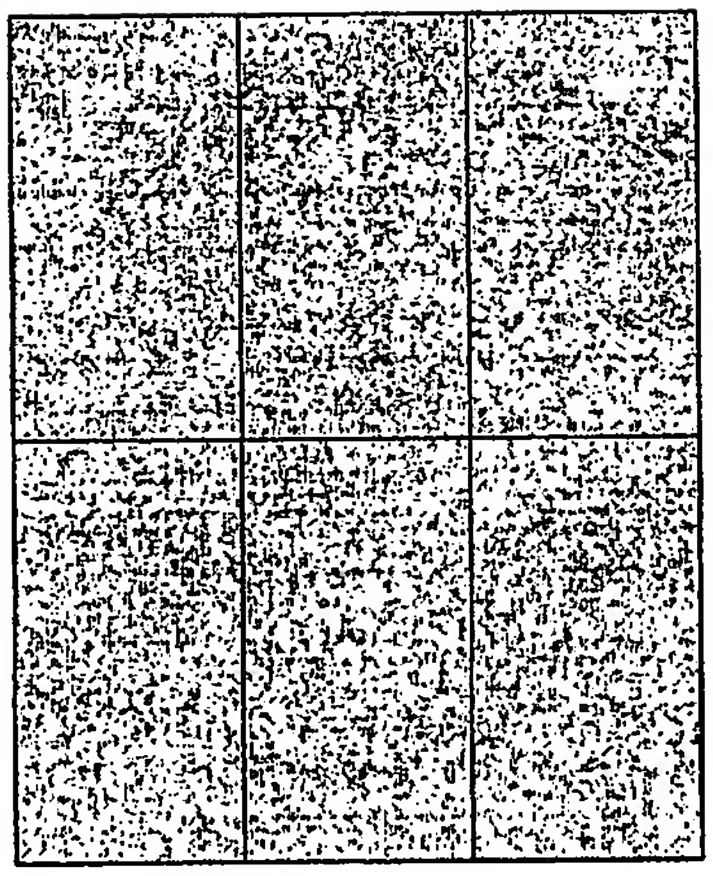

Fig. 2 PRIOR ART

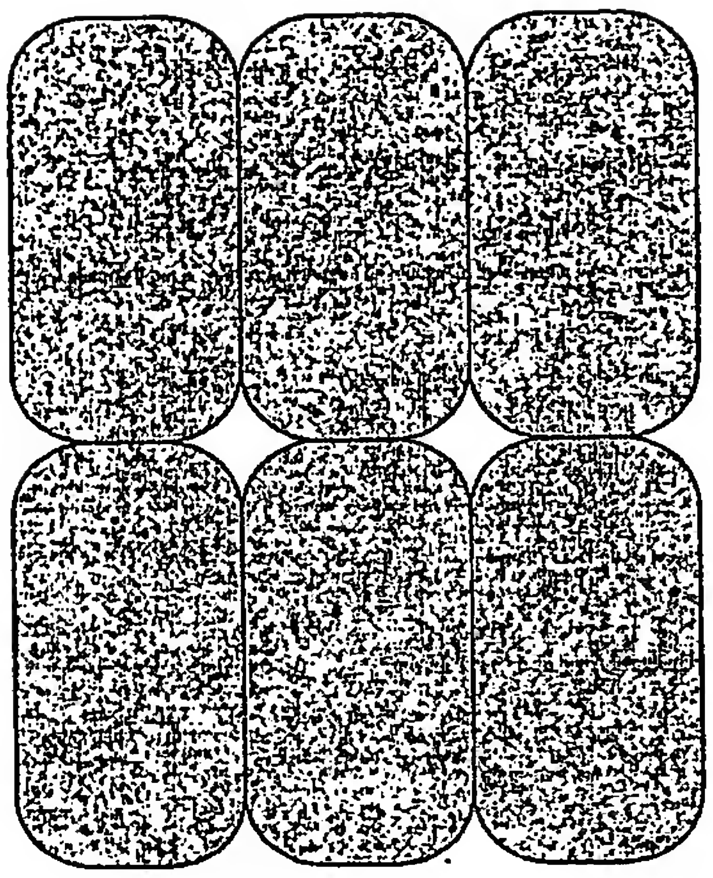

Fig. 3

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